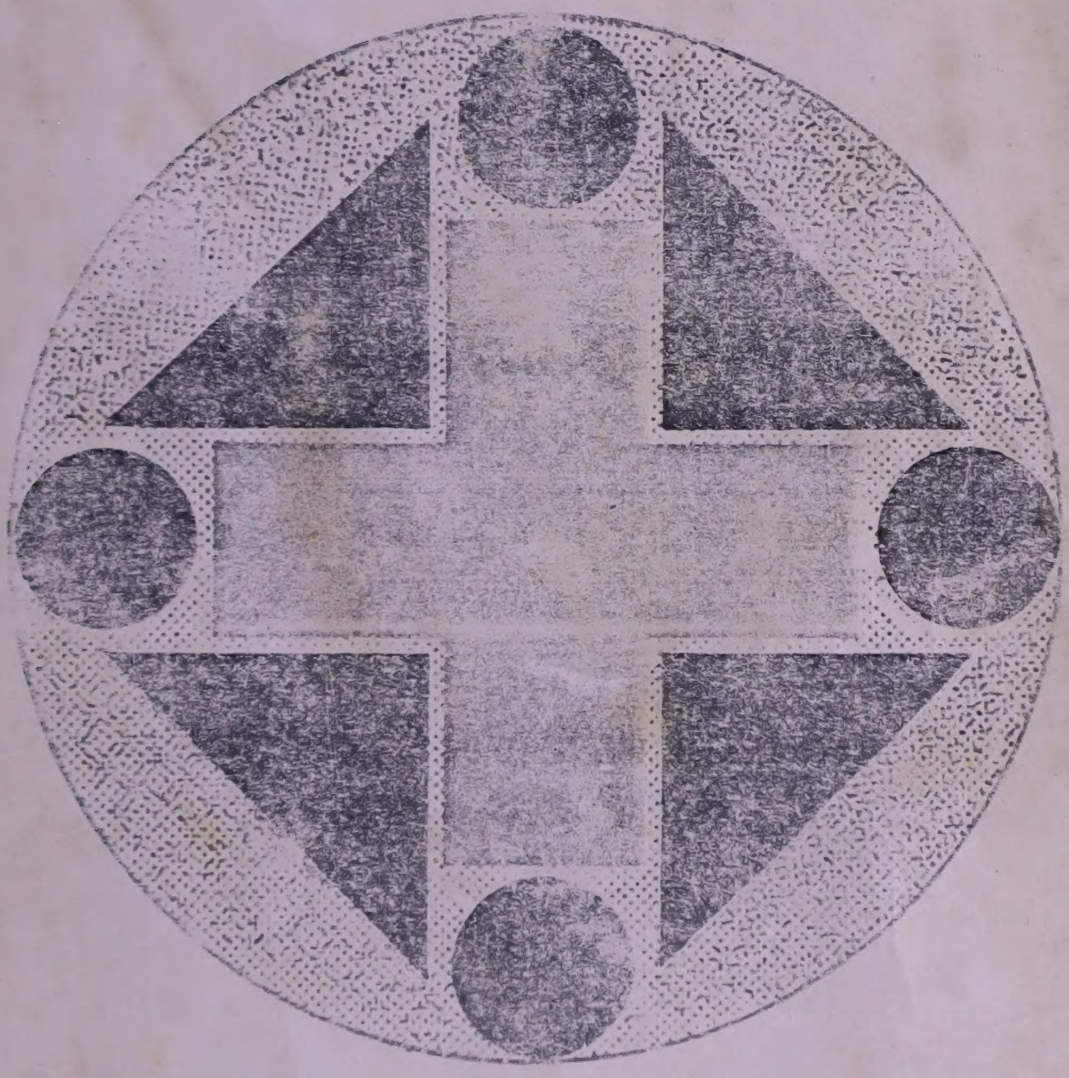
MODULE - 10

EPIDEMIC MANAGEMENT



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DISTANCE LEARNING
IN
HEALTH AND FAMILY WELFARE MANAGEMENT

MODULE 10.0

EPIDEMIC MANAGEMENT

NATIONAL INSTITUTE OF HEALTH AND FAMILY WELFARE
NEW DELHI 110 067.

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Preface

Dear Students,

I am delighted to put this module in your hands. Quite rightly the consortium on Health and Family Welfare Management focussed its effort to decentralise the training through Distance Learning for Health Officers who are the main health systems manager at the district level. The strategy has been to collaborate and involve inter-institutional resource competencies. NIHFW in collaboration with premier health institutes and Indian Institutes of Management have worked together at institutional and individual levels in developing the learning material.

It would be relevant to describe the colossal effort that has gone into the production of these modules. A series of review meeting of core group and expert group and few workshops were organised at various stages of the preparation of the learning material for the modules. In an effort to make the learning material need-based and realistic the feed back was obtained from a group of district health managers themselves at the pretesting stage. It has enabled us in incorporating necessary improvements and help us in the production of these modules in the language and idiom which you may understand better.

The Core Group will feel highly rewarded if the module is found to be reader friendly, clarifies concepts, builds confidence and helps the readers to improve their managerial competence and increase the effectiveness of their organisation.

Wish you a very happy career.

J.P. GUPTA
Director

March, 1992
N.I.H.F.W.,
New Delhi.

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MODULE 10.0

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Module 10.0 : Epidemic Management

10.1.1 Introduction

Epidemics often occur in the community. They happen in different ways but district health administration need to follow a reasonably systematic approach in order to manage them. It envisages to follow an orderly sequence for effective management and control of an epidemic. However the approach has to be disease specific and procedures may vary according to local circumstances to manage epidemics effectively. A district health officer need to collect information about the disease, review previous levels of endemicity and check with his own informations system for cases, describe the epidemic based on possible diagnostic criteria, determine population at risk, find the cause of the epidemic and plan to institute measures to control by attacking the source, interrupting transmission and protecting susceptible people. To do this he may have to plan, mobilise and organise resources, train manpower, educate community and seek their participation, direct the activities and monitor and evaluate its status continually till it is properly controlled as to prevent recurrence. Reporting on the epidemic is also very crucial. In this module you would learn, how to manage epidemic effectively.

10.2 Objectives

After going through the module, the students are able to:

(i) explain the epidemic, its nature and dimensions
(ii) utilise the scientific methods for anticipation of epidemic
(iii) manage epidemic effectively by instituting appropriate control measures for the disease.

10.3 Units

In order to achieve the above objectives the following three units are presented as part of this module. These are:

Unit 10.1 Epidemic its nature and dimensions.
Unit 10.2 Anticipation of an epidemic.
Unit 10.3 Control and Management of an Epidemic.

Unit 10.1 Epidemic, Nature and Dimensions

10.1.1 Objectives

At the end of the unit the student is able to:

(i) explain an epidemic situation and describe the patterns of epidemics
(ii) identify inter relationship between epidemic and disaster
(iii) outline the steps involved in control and management of epidemics

10.1.2 Key terms and Concepts

Epidemics, endemics, expected occurrence of disease, factors responsible for disease transmission, preventing epidemic.

10.1.3 Introduction

Different National Health Programmes focus to contain the various communicable diseases and reduce their incidence and prevalence so that they do not take any epidemic form. Serious epidemics are now uncommon. Still epidemics of different disease occur in different ways in the community. It is related to the previous incidence of the disease in the area among a specified population, different seasons and different local environments. Generally epidemic denotes incidence of a disease more than the normal occurrence in an area.

Water and food borne diseases are good examples of epidemic that affect the community from time to time. Measles and influenza are other diseases that generally show marked seasonal and annual variations in incidence. Even non communicable diseases like cancer, goitre, blindness, heart diseases, and mental sickness are also of epidemic dimension.

Therefore, it is important to recognise a potential epidemic, its nature and then to determine the existence and size of the out break and its various dimensions to manage the same. This unit presents a detailed discussion regarding these aspects.

10.1.4 Epidemics

If we look back in history we see that the chance association of prominent events with increased incidence of disease led to the belief of divine or supernatural forces being responsible for those diseases. The increased incidence of rabies during the time of the rising of Siries (the 'dog star') made people believe that the divine forces were responsible for the epidemic. Similarly out breaks of dysentry when the Nile flooded was attributed to the 'Wrath of the Gods' and it gave rise to the concept of supernatural forces controlling diseases. With the growth of civilisatilon, in the Roman era, the preponderance of cases of fever with chills and rigors (malaria) in the vicinity of swampy marshes led to the associatilon of the 'bad air' of the marshes with the disease. This was an empirical approach to determine the cause of disease. John Snow went a step further by illustrating that the cases of Cholera in London were lower in the houses supplied water by one company than in case of the people drinking water supplied by

another company. On investigation water supplied in second case was from polluted area of the river Thames. He associated the disease with the pollution of water. With the development of medical science, the very concept of the causal relations and the age old beliefs about the disease have changed.

Epidemic is a derivation of two Greek words epi (upon/among) and demos (people. It is the 'unusual' occurrence in a community or region of a disease specific health related events "clearly in excess" of the "expected occurrence. Thus any disease, which occurs in numbers more than the expected occurrence, constitutes an epidemic. It includes not only the communicable diseases but also the non-communicable diseases like coronary heart disease or even the psycho-somatic disorders. Health related behaviours like smoking, drug addiction and health related events like accidents also fall into the category of epidemics. Then to determine an epidemic the major question is how to define the "expected occurrence" so as to call the certain disease frequency as an epidemic one.

There is no constant number for the expected occurrence of a disease. It varies from place to place, region to region. A few hundred cases of yellow fever in a district or a country like Nigeria or Ethopia shall be called as the expected occurrence of the disease in that area. On the contrary in a district of an equal population in India, where the disease is non-existent, the expected occurrence shall be zero. So the basis of defining an epidemic is the defining of an endemic.

An endemic is defined as the constant presence of a disease or infectious agent within a population in given geographical area, without importation from outside. It may also refer to the usual prevalence of a given disease within an area.

The incidence clearly in excess of this expected occurrence or the endemic frequence shall constitute an epidemic. A few cases of yellow fever in a district in India shall constitute an epidemic where as a few hundred cases of yellow fever in a districtk in Nigeria shall not become an epidemic. Now let us take the example of small pox. Twenty years from today small pox was rife in the country. It was thus an endemic disease. Now it has been eradicated from the country or the world for that matter. It is no more an endemic disease. The expected occurrence of smallpox is zero. A single case of smallpox will, therefore, be clearly in excess of the expected occurrence and hence would be now considered as an epidemic of smallpox. So a disease, which was endemic once, may cease to be so and a single case may be taken as an epidemic.

A disease is both endemic and epidemic depending on the frequency. In some districts of Rajasthan water becomes scarce in summers and may result in getting polluted. Therefore water borne diseases like infectious hepatitis and typhoid may be common. To illustrate, in a village having a population of one thousand, every year eight to ten cases of typhoid and infectious hepatitis occur in the month of June and in November when the situation of water eases the number of cases drops down to two or three. Now in a given year, nine cases of typhoid in June will constitute an endemic but nine cases in November shall constitute an epidemic.

The difficulty generally arises as to when to label the disease to have assumed epidemic proportion in a region where it is normally endemic. In a zone where malaria is endemic when do we say that epidemic of malaria has broken out. For instance a disease like hepatitis 'A' is endemic in District X. When shall we say that an epidemic of Hepatitis 'A' has broken out in the district? The decision is slightly arbitrary. If the number of cases are more than two standard errors from the endemic frequency it will be called an epidemic. Keeping a track and diagnosing a disease taking an epidemic dimension at the earliest is the hallmark of an efficient health administration.

Epidemiological triad

The advances in Microbiology gave birth to the concept of the germ theory of disease. A single biological agent is held responsible for one disease. The theory gained wide acceptance but as knowledge grew it was realised that all people exposed to tuberculosis bacilli did not develop the disease. All smokers did not develop carcinoma of lung. It was then thought that the causation of disease extended beyond the germ theory of diseases.

Later the interaction of the disease causing agent, the human host and the environmental factors were considered to be responsible for the causation of a disease. In order to control diseases all these three factgors need to be manipulated.

Essentially three epidemiological factors that are involved in disease occurence namely agent, host and environment, constitute the epidemiological triad. Disease can not occur in the absence of any of these factors. These factors operating in combination determine not only the onset of disease which may range from a single isolated case to epidemics but also the distribution of disease in the community. The reaction of human host to infection depends upon his status of being immune to a disease or capacity to resist it. However excessive presence or relative lack of an agent is must for a particular disease. For many diseases the agent is still unrecognised e.g. peptiuller, hypertension, coronary heart disease etc. The virulence of an agent and hostility of environment add to individuals susceplibility to disease. The multiple factors causing disease have to be directly or indirectly related to this triad. This concept lends to multiple approaches for the prevention/control of disease and epidemics.

Check Points

1. Define an epidemic.
2. Explain epidemiological triad
3. What is meant by zero incidence of a disease?

10.1.5 Pattern of Epidemics

The epidemics generally follow a pattern depending on the geographical and environmental conditions, the distribution and characteristics of the host population, and their socio cultural behaviour. If there is no intervention or change in these conditions, those epidemics tend to

repeat themselves. Therefore knowing about the various kinds of epidemics and the conditions in which they occur can thus be of immense help in managing them.

Types of Epidemics

The various types of epidemics that normally occur are described below:

(a) Common Source Epidemics

These epidemics originate from a single source of infection or the disease producing agent. Graphically they represent a skewed curve as in Figure 1. The two Common Source Epidemics are described below:

(i) Point Source or Single exposure epidemic

The agent responsible for the causation of disease is exposted to the agent population at risk at one point of time and only once. For instance, a marriage party may get an epidemic of food poisoning due to eating of contaminated food, the point source of the epidemic. The cases will occur within its incubation period. The time after which half the number of cases occur is known as the median incubation period. (Figure 1)

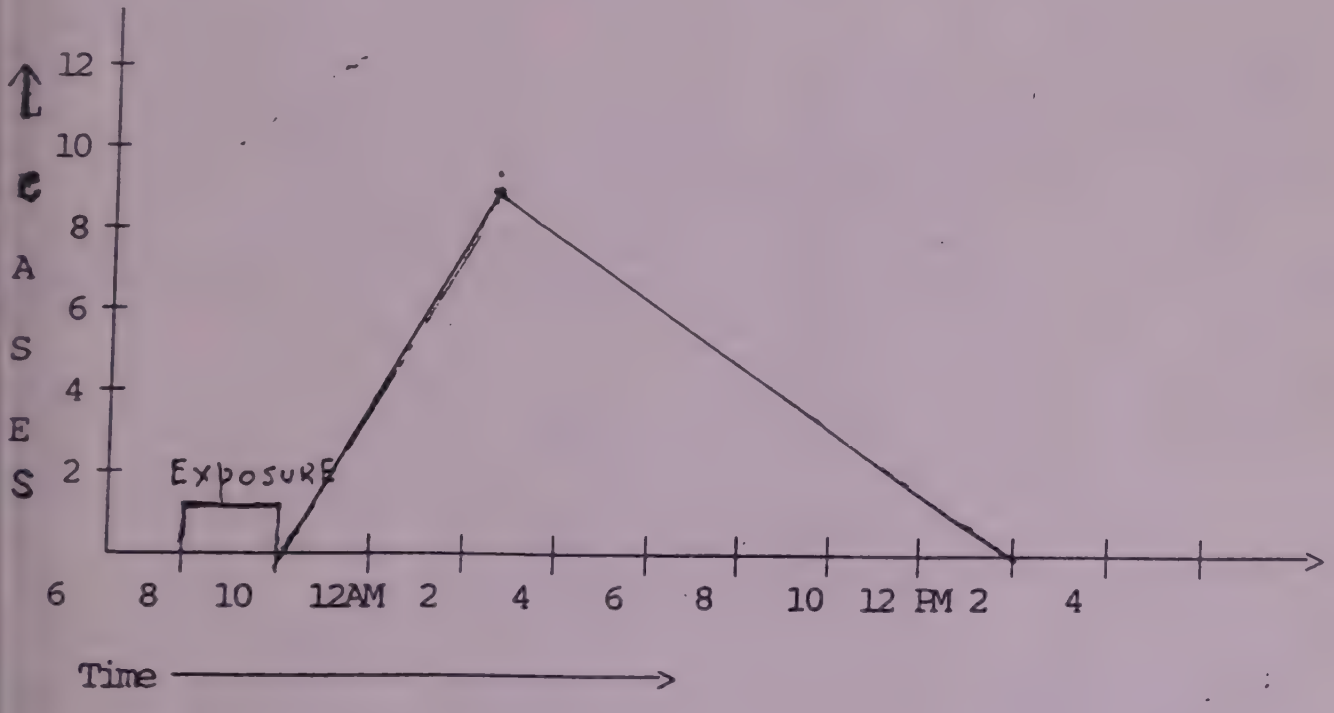


Fig-1: Epidemic curve of exposure to staphy lococcal contaminated food

It normally has one spurt which rises abruptly and declines equally fast.

A single exposure epidemic may also be caused by a chemical (Bhopal Gas Tragedy) or a pollutant (Chernovyl nuclear holocaust).

(ii) Continuous or multiple exposure epidemics

The source of infection for the causation of an epidemic may be continuous. In such a case the epidemic shall not cease to exist till the source is removed. A well with contaminated water becomes a regular source of infection to the people using it and the epidemic may continue till the time the water is treated and made potable. Similarly a cook who is a typhoid carrier may keep on infecting the diners in the restaurant till he is treated and made non infectious.

(b) Propagated Epidemics

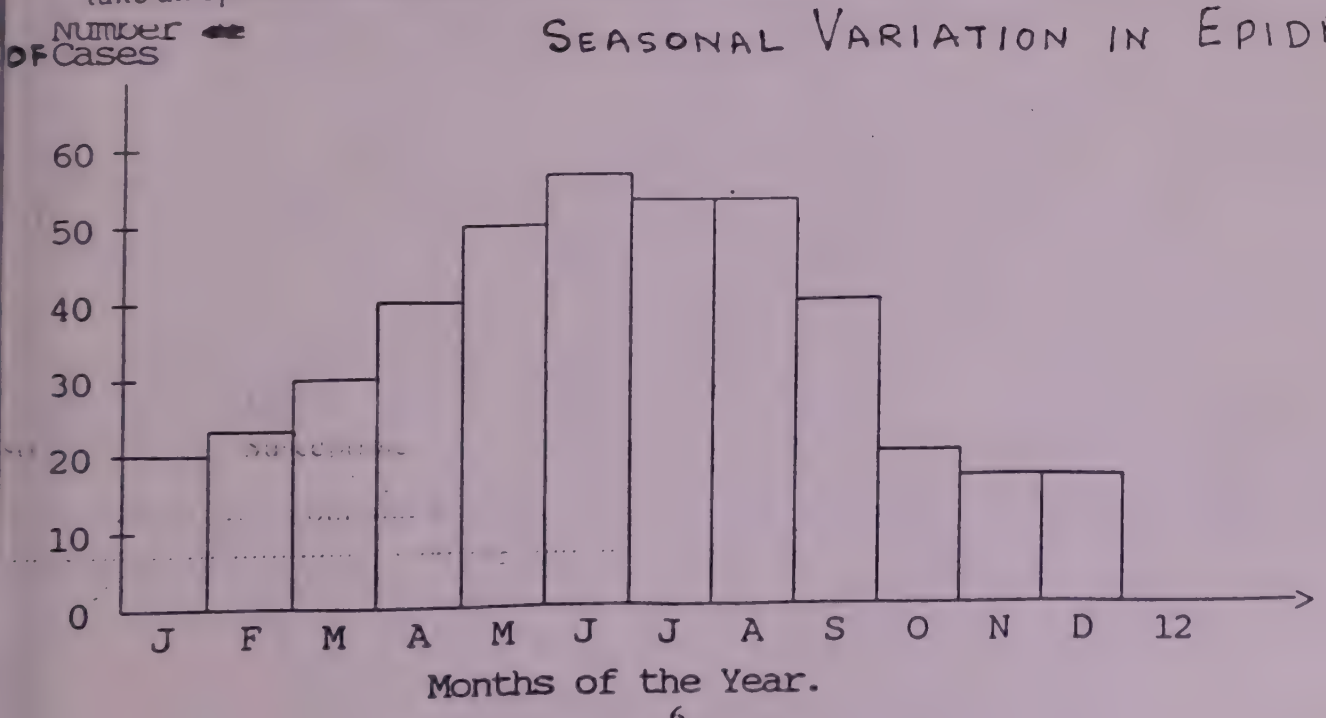
(i) Infectious epidemics

The propagated epidemics are generally of infectious origin and the tranmission of infection is from person to person Vector tranmission may also be there in disease like Malaria, Guinea worm, like Cholera, gastroentritis and conjuctivitis etc. The speed of spread depends on herd immunity, secondary attack rate and opportunities for contacts. These epidemics tend to show radial spread with the generation of a case.

The typical point source curve as in fig.1 may be affected by the government of secondary cases or by a long and variable incubation period. Conversely, propagated spread of a disease like influenza, which has a short incubation period and is highly infectious, can create a rapidly rising and falling curve similar to that of a point source epidemic. However, geographic distribution can help to differentiate the two types of epidemics. The propogated epidemic spreads gradually and the fall is much slower and it ends when the susceptible host population is either depleted or protected.

(c) Seasonal epidemics

Infectious diseases and some non-infectious disease both tend to have an increased incidence during the summer months and similarly the respiratory infections during the winter months. Road traffic accidents are more frequent in rainy months and asthma in spring. These diseases take an epidemic dimension only during specific season. (Fig. 2)



(d) Cyclical Epidemics

Some epidemics tend to occur in cycles which may repeat itself in weeks, months or years. Measles tends to present epidemics in a cycle of every 2-3 years. To break it, there is a need to create herd immunity. If the herd immunity is already there in the community, there is every likelihood that the disease would not take epidemic form. The following example illustrates the same

Suppose there is a community where measles infection was introduced for the first time in (1985) and there had been no immunisation against measles. There are twelve children whose age is three years or less. One of them is infected with measles and 3 others contacted the infection from him. They consequently infacted six of the rest of the children. Thus, all the twelve children became immune to further infection of measles as all of them had developed herd immunity either by suffering with the disease or 80% or more of them by getting proper immunisation.

1985 Rajiv(3 yrs)	1. Sanjiv (1 yr)	1. Rajesh (1 yr) 2. Dinesh (2 yrs) 3. Geeta (3 yrs)
	2. Reena (2 yrs)	1. Sunita (1 yr) 2. Jayant (2 yrs)
	3. Meena (3 yrs)	1. Ravi (1 yr) 2. Shastri (2 yr) 3. Vinita (3 yrs)

After one year four more children (Sunita, Ajay, Hari, Nishal) were born who were under one year of age. All these four were susceptible to measles. Thus, out of the total children aged three or less excluding Rajiv, Meena, Geeta, Vinita who are four years old only four were susceptible to measles. So the position in 1986 was as such:

Year 1986

Rajiv, Meena, Geeta, Vinita - 4 years old

Name	Age	Infected with measles	Immunity status
Reena, Dinesh, Jayant, Shastri	3 yrs.	Yes	Immune
Sanjiv, Rajesh, Sunita, Ravi	2 yrs.	Yes	Immune
Sunil, Ajay, Hari, Nisha	1 yr.	No	Susceptible

Measles infection somehow is introduced in the community. Only four out of the twelve children (33%) can contact the disease. In other words the herd immunity is 66.7% and an epidemic of measles is less probable.

In 1987 four more children (Sangeeta, Shekhar, Shridhar, Sarita) were born. They were susceptible to measles infection. The position for the year was:

Year 1987

Reena, Dinesh, Jayant & Shastri 4 years old

Name	Age	Infected with measles	Immunity Status
Sanjiv, Rajesh, Sunita, Ravi	3 yrs	Yes	Immunity
Sunil, Ajay, Hari, Nisha	2 yrs	No	Susceptible
Sangeeta, Shekhar, Shridhar, Sarita	1 yr	No	Susceptible

So out of the twelve children aged three years or less eitht (66.7%) were susceptible to measles. The herd immunity had gone down by 33% and an epidemic of measles became a potential threat.

In the year 1988 four more children (Ramesh, Arjun, Sita, Draupadi) were born. The position for the year 1988 was

Year 1988

Sanjiv, Rajesh, Sunita, Ravi 4 years old

Name	Age	Infected with measles	Immunity status
Sunil, Ajay, Hari, Nisha	3 yrs.	No	Susceptible
Sangeeta, Shekar, Shridhar Sarita	2 yrs.	No	Susceptible
Ramesh, Arjun, Sita, Draupadi	1 yr	No	Susceptible

In the age group of children three years or below all the twelve children (100%) were suceptible to measles and the herd immunity had been reduced to zero. If there had been introduction of the measles infection in this community the situation was ripe for a full blown epidemic. This accounts for the measles epidemic to occur in a cyclic manner every 2-3 years.

Immunisation makes a child immune to measles but what is more important is that it improves the herd immunity of the community. Immunisation thus not only protects an individual from the disease but also the community from epidemics. Thereforel in case of such communicable diseases which are prone to cyclic epidemic, the need for immunisation of new born within Ist year becomes imperative as evident from UIP programme. The cyclic epidemics are not limited to infectious diseases only. Certain behaviour rrelated epidemics may also present in cyclical form. Road traffic accidents are markedly increased during the weekends due to a spurt in the drunken driving.

(e) Epidemic of None Communicable diseases

In the present era with the advances in science and technology the distances have become shorter and as the life style has changed to a very sedentary and affluent with little physical activity. This has resulted in a marked rise in diseases like ischaemic-heart-diseases, diabetes mellitus, cancer and mental diseases. Today even these non-communicable diseases have reached epidemic proportions. Those have to be cared for the every possible attempt should be made to control them. Earlier due to lack of good diagnostic facilities often concealed the size of the epidemic. The chances of these diseases to take an epidemic form in India are very great if no adequate preventive measures are adopted.

Check Points

1. The medical officer from a PHC reports to you that a case of yellow fever has occured in a village. Will you call it an epidemic? if so, why?
2. Under what conditions would you label an endemic disease to be an epidemic one? What do you mean by herd immunity?
3. Can a non-endemic disease cause an epidemic in a defined geographical area?
4. A disease has equal prevalence in two different geographical areas at a given point of time. Can it be endemic in one and epidemic in another area? If so, why?

10.1.6 Inter-relation between epidemic and disaster

It has almost been a phenomenon that the so called disasters like wars, famines, floods and social upheavals are followed by epidemics of scabies, cholera, dysentry, typhus and other diseases.

A natural disaster is followed more often by an increased mortality and morbidity the communicable disease also show rising trend after the disaster has 'settled'. Diseases like cholera, typhoid, hepatitis, gastroenteritis, respiratory infections meningitis, measles, whooping cough, diphtheria are important public health problems following disaster. Often scabies and other skin infections, tuberculosis and malaria also show a drastic increase depending on various socio-economic, environmental and cultural factors and the nature of the disaster. Specific or a group of communicable diseases that present itself in an epidemic form following a natural disaster may be attributed to some common factors which are as given below:

(a) Temporary population settlements

Rehabilitation operations follow a disaster. They set up crowded temporary camps or settlements. Provision of safe drinking water, sanitation and other basic services often lack. This results in a rise in the incidence of diarrhoeal diseases, dysentry, measles, whooping cough, tuberculosis, scabies and other skin diseases.

(b) Pre-existent Diseases in the Population

The diseases already endemic in the area are most likely to present as epidemics when struck by a disaster. A small pox free shall never be followed by a small pox epidemic, whatsoever the disaster may be.

An outbreak of diarrhoea, dysentry, cholera, hapatitis and even typhoid may be expected in endemic areas. Acute respiratory infection, meaningococeal meaningitis, measles, whooping cough, and dihptheria may show a rising trend. Louse borne typhus and relapsing fever also have potential for becomning epidemics in endemic areas.

(c) Ecological changes

During natural disaster like floods and cyclones ecological changes occur. It causes increas in the breeding sites for mosquitoes. This results in an increase in the cases of malaria. Open defaecating and decay and decomposition of organic material increases insect breeding and thereby increases the transmission of diseases like conjuctivitis, shigella dysentry, enterovirus infections and some parasitic diseases.

(d) Resistance Potential of the Host

The nutritional and immunisation status of the host population determines to a large extent its susceptibility to communicable diseases. Children with PEM are more likely to get infected with communicable diseases and the incidence of measles, whooping cough, diphtheria and tuberculosis will be higher if they are not immunised earlier.

(e) Damage to public utility and Interruption of Public Health Services

Public utility servicesd like water supply and sewage if damaged may cause largae scale contamination and subsequent introduction of disease in the population. Public Health Programmes being carried out in the area if interrupted may show a serious resurgence of diseases. Immunisation programme if, not carried out leads to an increase in the vaccine preventable diseases. Thus, depending on the type of disaster and the pre-existent factors a public health officer can very well "anticipate" the epidemic and its intensity which is likely to follow. In module 9.0 you have already read to manage them.

Check Points

1. How does the knowledge about the past occurrence of epidemics help us?
2. When do we see a sharp fall in admissions in a hospital following a disaster?
3. Do the communicable diseases show a rising trend after a disaster? If yes, when?
4. Due to what factors the diseases assume epidemic proportions after a disaster?

10.1.7 Preventing Epidemics

Control or Eradication of a disease

The top priority laid by any health planner is to reduce the incidence and prevalence of the diseases which are major public health problem and are highly endemic and have been causing occasional epidemics. Let's take the example of malaria. The National Malaria Control Programme (NMCP) was launched in 1953. Residiul spraying with DDT was done twice a year. The incidence of malaria dropped from 75 million cases (1953) to 2 million cases during 1958. The achievements being spectacular the Government of India changed the strategy from control to eradication and named it as National Malaria Eradication Programme.

The control of a disease is reduction in both incidence and prevalence to a level where it ceases to be a major public health hazard like Malaria with an Annual parasitic index of 1 to 2. The disease any way is still present. So is the disease agent and the factors responsible for its transmission. In other words the disease still continues to persist in the community. Eradication is the total elimination of the disease. It is zero incidence phenomenon e.g. small pox which has been eradicated from the globe. To eradicate a disease is much more difficult than controlling it. Hidden foci of infection, unrecognised modes of transmission, resistance of the vector or organism prevent the diseases from being eradicated. Therefore the focus during epidemic is always on control of the disease.

Epidemic Control and Management

The control and management of the epidemics is the responsibility of the District Health Officer. You therefore have to chalk out a strategy so that epidemics do not break out in your district and if it so happens you control it at the earliest. You will learn about it in details in the subsequent Units of this module. Herein we present the same in outline:

The management and control of epidemics involves folllowing aspects:

(i) Anticipation of an epidemic and establishing its presence
(ii) Investigation of cases
(iii) Disease control
(iv) Preventing recurrence

To carry out the above activities effectively a D.H.O. would have to undertake the following:

1. Review the information and reports on epidemics that have occurred in the past years in the district and determine the trend and likelihood of their occurrence.
2. Check records and seasonal incidence to establish presence of an epidemic
3. Enquire on the first sign of a suspected case to confirm whether there is epidemic or not.
4. If there is an epidemic, even otherwise, need to confirm the diagnosis of the cases
5. Conduct further case finding based on survey of the community, information from sentinel centres and passive surveillance of the cases.
6. Search for source of infection and trace contacts.
7. Isolate the cases and treat them while investigations are on.

8. Attack source of infection and interrupt transmission.
9. Institute measures of health educatilon and preventive care.
10. Continue with surveillance activities
11. Compile information, process and analyse to prepare a health action plan.
12. Implement the health plan to prevent recurrence of the epidemic.
13. Develop a contingency plan within the available resources to deal with an epidemic in futute.

You might have observed that during the various five years plans stress was laid on survey and detection of major communicable diseases and eradication of comparatively easily eradicable diseases like polio, tetanus, guinea-worm etc. following the success strategy of small pox. As a strategy effective supervision and monitoring ensures prevention of communicable diseases from taking epidemic dimensions. In order to effectively control and manage epidemic there is a need to establish district wide chain of sanitary cum epidemiological stations functioning between the primary and secondary levels of health infrastrcture which should be an integral part of the district health organisation. The district health officer should initiate fucntioning of those stations for undetraking of integrated action to eradicate or control local endemic diseases diseases becoming epidemic.

Check Points

1. What is the difference between control and eradication of diseases?
2. What is the relevance of knowing the epidemics that have occurred in the past in the district?

10.1.8 Unit Review Questions

1. The medical officer from a PHC reports to you that a case of measles has occurred in a village. Will you call it an epidemic? If yes, why? If no why?
2. Under what conditions would you label a disease to be potentially epidemic?
3. You are going through the monthly statistics of the STD clinic of your district hospital. The statistics is as follows:

	Disease	Clinically diaghised	Incidence	Laboratory confirmed
1.	Gonorrhoea	32		30
2.	Syphilis	22		22
3.	Genital herpes	4		-
4.	Chanchroid	3		-
5.	AIDS	0		2 (HIV + Ve)

Which of the following diseases will you label as a potentially epidemic one?

4. You visit a sub-centre where the health worker shows you the statistics of the diseases for the month of January it is as follows:

January 1990

1.	ARI	56
2.	Scabies	14
3.	Gastroenteritis	10
4.	Hyperemesis gravidarium	6
5.	Injuries	6
6.	Viral hepatitis	4

You ask him to show the previous records. They are as follows:

Disease		July-88	Jan.89	July-89	Jan.90
1.	ARI	22	50	20	56
2.	Scabies	14	12	18	14
3.	Gastroenteritis	32	2	34	10
4.	Hyperemesis gravidarum	4	5	3	6
5.	Injuries	7	5	4	6
6.	Viral hepatitis	9	00	10	4

Which of the following diseases will you call, as reaching an epidemic proprotion in Jan, 1990?

5. You have read about the distribution of disease in terms of time, place and person. Explain its significance in terms of epidemics.
6. Explain the significance of the epidemiological trial of the agent, host and environment in relation to the epidemics.

10.1.9 Test Items

Select the most suitable or the correct answer from the following and tick against that:

1. An epidemic is the occurrence of a disease that is present in the community:

   (a) In small number
   (b) In large numbers
   (c) Rarely
   (d) In unusually large numbers

2. Which of the following diseases can cause an epidemic

   (a) Communicable diseases
   (b) Non-communicable degenerative diseases
   (c) Behavioural diseases like drug addictions
   (d) All of the above.

3. Which of the following may lead to take an epidemic form

(a) Congenital heart disease
(b) AIDS
(c) Tumors
(d) All of theabove

4. An endemic disease can take the form of an epidemic

(a) Always
(b) Often
(c) Rarely
(d) Never

5. Which of the following factor checks the propagation of an epidemic

(a) High virulence of the infective organism
(b) High secondary attack rate
(c) High herd immunity
(d) Good opportunities for contact

6. Faster the spread of an epidemic its duration is

(a) Very short
(b) Normal
(c) Very long
(d) None of the above

7. After natural disasters there is a sudden rise in the number of cases of the following:

(a) Trauma
(b) Shock
(c) Psychological disturbances
(d) Communicable disease

Following a natural disaster a disease in the population can take the form of an epidemic provided it is

(a) pre-existent in the community
(b) Non-existent in the community
(c) Its epidemic has occurred in the past
(d) None of the above.

9. A disease which has been controlled in a population can later become

   (a) Endemic but not epidemic
   (b) Epidemic but not endemic
   (c) Both endemic and epidemic
   (d) None of the above.

10. A disease which has been eradicated in a population can later become

   (a) Endemic but not epidemic
   (b) Epidemic but not endemic
   (c) Both endemic and epidemic
   (d) None of the above.

10.1.10 Suggested Reading

1. American Public Health Association Control of communicable diseases in Man.Abram 5. Ben enzon.
2. Epidemiology of National Disaster J. Seamen. Kargh
3. Park J.E. & Park, A test book of Preventive and Social Medicine.
4. P. Bres, Public Health Action in Emergencies caused by Epidemics, W.H.O., Geneva.
5. Brain Macrohohan and Thomas F. Pugh. Epidemiology - Principles and Methods. Little Brown and Company, Boston.
6. Bhatnagar S. et al, Training Modules in Epidemiology for Medical Officers, NIHFW Pub., New Delhi, 1988.

Unit 10.2 Anticipation of an Epidemic

10.2.1 Objectives

At the end of the unit the student is able to:

i) identify the data sources for anticipating an epidemic
ii) define the data requirements of District forecast and monitor an epidemic.
iii) use different analytical techniques for anticipating epidemic in the district.
iv) define the role of laboratory in investigation of an epidemic
v) define the role of district health officer in and required preparedness in anticipating and managing an epidemic.

10.2.2 Key terms & concepts

Epidemics, Forecasting epidemics, surveillance, routine reporting, sentinel centre, Analytical techniques, meet epidemics, role of laboratory and D.H.O.

10.2.3 Introduction

Epidemics generally tend to follow a pattern and repeat periodically when the conditions are ripe again. In unit 10.1 you have already learnt about the types of epidemics the knowledge of which can be of immense help in forecasting and controlling them.

The way an epidemic shall present itself in the community depends on the distribution and characteristics of the host population, their social pattern, their cultural behaviour, the geographical distribution and the various environmental factors. Just as in clinical practice a patient does not come with all the signs and symptoms described in the text books and the clinician has to use his clinical acumen to diagnose a 'case' similarly an epidemic may not always present in its 'typical' type. An alert epidemiologist with a keen eye, however, can always predict and diagnose an epidemic. An epidemic may also present itself in a very unusual manner. An epidemiologist, therefore, should always be on alert so that an epidemic does not escape his notice. To do so, he must be aware of the data sources in order to forecast an epidemic situation.

10.2.4 Forecasting of Epidemics

At times even the best of administrators may not be able to 'forecast' an epidemic and may start action only after it has occurred. It shall anyhow be a crisis if the administrator becomes aware of the epidemic after it is in full swing. Methodical surveillance shall, in most cases, ensure the early forecasting of an epidemic and prompt intervention shall check or contain the disease before it reaches its peak. Surveillance, thus, is of paramount importance in epidemic management.

Correct, accurate and reliable data is required if the forecasting of epidemics is to be efficient. This emphasises the importance of an efficient District MIS system. The major sources of data for forecasting of epidemics are:

Data Source For Forecasting Epidemics

(a) Epidemiological Surveillance

Surveillance means to keep a continuous vigil on, occurrence and distribution of diseases, population dynamics, community behaviour and environmental processes that result in an increased risk of ill health in the community. Surveillance provides a rich data source to a D.H.O. to plan for the surveillance in order to control the disease the district officer must be able to identify the high risk group in terms of person, place and time. He should be able to seek answers to the following questions:

i) Who gets the disease?
ii) Where do they get the disease?
iii) When do they get the disease?
iv) Why do they get the disease?
v) How do they get the disease?

The surveillance system consists of the following essential steps:

i) Collection of relevant data
ii) Analysis of data and its interpretation
iii) Planning health action. However, for forecasting only Ist two steps will be required.

The primary purpose of surveillance is to use the information obtained at the district level. It is also necessary to report the data to the state health authorities. This is required to help them analyse the data for all the areas within the State and inform you about situations elsewhere which might affect your area so that you can be vigilant.

The common surveillance techniques for the collection of data are:

a) Passive surveillance and routine reporting from health institutions in the district.
b) Sentinel Centres
c) Active Surveillance
d) Epidemiological investigations
e) Sample surveys

Each of these methods has its advantages and disadvantages. The methods can be used separately or in combination depending upon need and feasibility.

(a) Passive Surveillance and Routine Reporting

The simplest and the most cost effective method of an early forecasting of an epidemic is through the routine reporting of diseases from different health insitution in the district.

All the health centres in your district (sub-centres, PHCs, dispensaries, Taluk and district hospitals) record all the cases treated with the name of the patient, age, sex, address, diagnosis, date of onset and other relevant information. As a district manager you have to ensure and ascertain that such consolidated records are maintained disease-wise on the following format at service points.

Daily recording of cases treated in sub-centre/health centre/hospital

Date	Day	Month	Year	Centre

Sr. No.	Name	Age	Sex	Address (village)	Diagnosis	Date of onset	Remarks
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							

Such a daily recording of cases can be adopted within to the prevalent system.

After each day's work the Health worker/doctor should record the number of cases of each disease with age and sex break up as well as locality from where the cases had come and the date of onset. This can be done in a tally sheet, a sample of which is given below. From the records maintained in the tally sheet fortnightly or monthly statements on the listed diseases should be prepared.

Tally Sheet for New Cases

Week/month Sub-centre/Health Centre_____
Year

S. No.	Age Group / Sex / Disease	0-1 M	0-1 F	1-4 M	1-4 F	5-14 M	5-14 F	15-19 M	15-19 F	20-45 M	20-45 F	45+ M	45+ F	Grand Total M	Grand Total F
1.	Malaria	2	0	6	7	11	10	14	11	22	24	20	12	75	64
2.	Diarrhoea														
3.	Dysentry														
4.	Measles														
5.	Diphtheria														
6.	Whooping Cough														
7.															
8.															
9.															

* These age groups are for illustration purposes only.

be effectively used in the following ways:

The following 20 diseases should be regularly monitored by you in your district and a copy of it should be sent to the state Bureau of Health Intelligence, (S.B.H.I.) or competent state authorities. The central Burreau of Health Intelligence (CBHI) in the Directorate General of Health Services regularly monitors them by getting information from the state. Through this regular monthly information for the year and comparing it with the past records a D.H.O. can keep the track and anticipate whether the disease is taking any epidemic dimension.

1. Diphtheria
2. Whooping cough
3. Tetanus
4. Measles
5. Poliomyelitis
6. Tuberculosis
7. Enteric fever
8. chicken pox
9. Influenza
10. Viral encephalitis
11. Viral hepatitis
12. Guinea worm
13. Dengue fever
14. Syphilis
15. Haemorrhagic fever
16. Meningococeal infection
17. Gonococcal infection
18. Diarrhoeal diseases
19. Malaria
20. Cholera

(b) Data from Sentinel centres

A sentinel information system provides reliable information on disease incidence from any medical institution, identified hospitals, health centres, laboratories, special disease hospitals etc. working as sentinel centres. They are asked to provide specific information on selected diseases. The main purpose of such sentinel centres in the district is to collect information to initiate immediate action, A copy of the data is sent to the state authorities. However, the following criteria need to be observed while selecting a sentinel centre.

i) Large attendance of patients in the institution.
ii) Availability of facilities for reasonably accurate diagnosis
iii) Good recording and reporting system

Since sentinel surveillance provides selective data based on the population attending the health institution, such data on analysis cannot indicate the trend of the disease prevalence in a particular area. However, the data thus collected can be effectively used in the following ways:

i) An abnormal increase in the number of cases as compared to the corresponding period in previous years calls for an immediate action.

ii) Seasonal pattern of disease can be clearly established, and thus help in planning for timely remedial action.

c) Collecting additional data through active surveillance

Active surveillance means actively looking for a particular type or group of diseases in order to detect the cases not recorded under the routine system. Active surveillance involves finding and reporting of cases by the health workers as well as the community. The degree of reporting is relatively better for the clinically distinct and easily recognisable diseases such as malaria, tuberculosis, polio etc. As a D.H.O. you should ensure that all the Health supervisors, workers, village health guides, and anganwadi workers play an effective role in finding new cases and thus help in active surveillance. Sometimes school teachers and other community leaders are also helpful.

A recognition card showing the typical symptoms of a particular disease, as in case of small pox can be shown to the members of the community and enquiries be made as to whether there was any such case in their locality. This, method was successfully tried in the small pox eradication. Cards prepared for guinea worm, poliomyelitis and neo-natal tetanus with diagnostic criteria and case definition are used in the field by the health workers to look for cases due to these diseases and even suspected/probable/possible cases during their visits to the villages. Active surveillance of the following diseases should be carried out:

i) Malaria, II) Tuberculosis, iii) Leprosy; iv) Diarrhoea, v) Acute respiratory infections and vi) Vaccine preventable diseases

(d) Epidemiological Investigations

Apart from identifying cases, epidemiological investigation provided important supplementary information, not often obtained from other surveillance methods, as to where and how to apply measures to prevent the spread of an epidemic. This is dealt in unit 10.3

(e) Special sample survey

Whenever you happen to know about the incidence and prevalence of the disease, sample survey can be conducted which is an active and efficient method of surveillance. It can be used for assessing impact of performance also. Surveys are, however, difficult to conduct, relatively expensive and call for highly skilled persons or persons trained for the purpose.

Data from District Health System

Data collection forms a part of the district MIS. The data generated from the villages or hamlets is computed at P.H.C. and through an efficient channel reaches the district headquarters. The data collected even by the village health guides, trained dais, anganwadi workers has to be compiled by the health workers both male and female and incorporated in

subcentre records which finally flows to the PHC and ultimately to the district headquarters and to the state end.

i. Sub-centre Level

During any out break the health workers - male and female may be asked to prepare list of cases of the disease occurring in their area as for routine reporting and submit it to Health Supoervisors who compiles and submits it to the Primary Health Centre on the day of the monthly meeting. The number of cases reported comprise not only those patients attending the sub-centre but also the cases reported, by the village health guides, the Anganwadi workers and trained dais.

ii. Primary Health Centre Data

The medical officer in the primary health centre collects the reports from all the sub-centres sectorwise on the day of the monthly meeting and critically review it in relation with the past data. In case of need he may ask for weekly reporting. Any increase in the mortality or morbidity should arouse suspicion. A discussion with the workers of the sub-centres should be done and prompt action should be taken if required. The data from all the sub-centres should then be compiled and sent to the district health officer at the earliest.

iii. Data from Dispensaries

All the dispensaries including that of ISM in the district should report monthly the statistics to its district health officer regardings the diseases listed earlier.

iv Data from Taluq Hospitals, District Hospitals and other Hospitals

A detailed classified report of the patients reporting to the OPD and admitted in the wards and emergencies should be prepared. The cause of death of all the deceased patients should also be incorporated in the monthly report.

v. Data from Non-Government Health Practitioners

The private practitioners who also provide health care to the community should also be brought within the net work of reporting cases in relation to the diseases discussed earlier, Every effort should be made to involve them and get the reports regularly. If there are unusually large number of cases due to a particular disease they should be motivated to report immediately.

(vi) Data from spotters

Spotters are people from the community who may help in the early detection of an 'outbreak'. Motivated spotters should be recruited from among the private practitioners, primary health care workers in the village, trained members of staff in schools, industry, public services and community leaders. A strategy should be developed to locate these spotters in the most suitable

places. They should contact health facility or a designated repsonsible person immediately if they suspect an outbreak.

(vii) At District Health Centre Level

The analysis of the data received from the above mentioned sources is done by the district Statistical Officer. He should draw D.H.Os attention earliest on suspicion. It shall suggest the epidemics that are likely to happen or have already occurred and the probable time of its occurrence. The passive surveillance carried out shall suggest the rise in the incidence and prevalence of the diseases in a tehsil/taluk, primary health centre, subcentre areas or even a village. The data on the disease on its comparison with the past data during the same part of the year may suggest an anticipated epidemic and the timely intervention may check it. A sentinel centre shall suggest the status of a disease, its pattern and trend in the district. It will also throw some light on the geographical distribution of the disease. With the application of the epidemiological techniques or some sample surveys the exact status in the particularly suspected areas can be known. This is of great importance in forecasting a disease.

Active surveillance is definitely one of the most effective techniques in anticipating an epidemic, it is time consuming and costly but the results produced are worth it. It gives a crystal clear picture of the disease and a keen eye can never miss an anticipated epidemic. So all these methods help us in identifying an epidemic.

The identification of the conditions that may cause an unanticipated epidemic are important. This alongwith the techniques for anticipating epidemics goes a long way in forecasting epidemics. A heavy monsoon may suggest water logging and increased mosquitoes breeding. It may thus suggest that an epidemic of malaria may occur. A hot dry summer may suggest scarcity of drinking water and more chances of contamination. An epidemic of water borne diseases is thus anticipated and by the application of the epidemiological techniques when and where the epidemic is likely to occur can be forecasted. A timely intervention can thus contain or stop it. All these factors suggest the following roles of the district health officer in anticipating an epidemic. As a district health officer the MIS will give you the best possible data to forecast an epidemic. The aspect that you should concentrate are:

Maintenance and Updating of MIS:

i. The collection of the data and its maintenance has to be done religiously. It may seem to be consuming time and effort but in the hours of crisis it is the data for MIS which shall give the clue for the solution of the problems. If you look back in the past you would realise that this is the most cost-effective procedure in the forecasting and even the management of the epidemic.

The data if not updated loses its significance and utility. Hence the MIS should be continually updated. The updating of the data has two advantages. First you are abreast with the latest situation and can keep a track of if and check its reliability. Secondly it informs you about the changes in the situation during that period of time. This change if observed carefully may suggest any possible potentially epidemic situation that is likely to occur.

ii. Sample field check on the reliability of the data

You are banking heavily on your MIS. All your possible actions are based on available data. Needless to say that this data should be reliable. Sample field checks should also be performed regarding the reliability of the data. You should make your district statistical officer/statitician responsible to carry out these sample checks in a planned way. Whenever this sample check shows a discrepancy the concerned worker should be educated and the importance of MIS in the health system be explained to him/her in detail. This activity should be taken by the district level beyond normal supervisory respectively.

iii. Analysis of data from clinic and keeping workers well informed

Quite often the data are collected sincerely but are not properly analysed. This defeats its very purpose. The mere number of cases of a particular disease may also have some value in trend analysis otherwise they have no meaning do not conote much. For instance 300 cases of tuberculosis in a block gives us some information about a prevalence of 3.0/1000 tell that it is below the national average and therefore not a matter of great concern. On the otherhand only 50 cases of tuberculosis in a subcentre within a (population of 5000) gives us a prevalence of 10/1000 which is very high and thus a matter of great concern. So all the available data should be calculated in terms of rates and ratios etc.

(iv) Preparing spotmaps

There may be occasions where the rates or ratios too may not tell the true picture. The overall rate of a disease may be very low to warrant any action but the cases may be clustered in a small geographical region giving it a very high prevalence/incidence and demanding an immediate action. Plotting the cases on a spot map solves this problems and these should be used whereever required.

(v) Creating base line information

This is the basic and most important use of the MIS. You can form the baseline for a particular point of time. Further, comparing with it over a periof of time, just at a glance, you can get information on the course of the disease and may even be able to suggest future projections. A very reliable baseline data helps us in forecasting epidemics confidently.

(vi) Data required for forecasting

With all the data and the various types of analysis available with your MIS for forecasting of the epidemics you require to get the following information:

i) Number of notified cases of particular diseases.
ii) incidence rate in relation to specific diseases
iii) prevalence rate
iv) mortality
v) Data of the past three years.
vi) Data related to seasonal variations of specific diseases

(vii) Techniques of Forecasting

The major technique of forecasting of epidemic is based on trend analysis of the particular disease over a period of time. In order to have a correct trend analysis you will have to undertake the following measures:

(a) Tabulation of the data on monthly basis and yearly basis for at least three years on the following parameters for immediate comparison and identifying the deviations.

- Disease
- Sex
- age groups
- Incidence/prevalence rate of the disease for the same months of three past years
- Regional, state and national incidence/prevalence rates or ratios of past years.

(b) comparison of monthly and yearwise data based on the available rates/ratios
(c) Plotting different graphs for (Total, sexwise, age groupwise incidence/prevalence X years)
(d) Preparing spot maps to detect regional variation.
(e) Comparing for seasonal and cyclic variation with respect to specific disease

10.2.5 Preparedness to meet the Epidemic

There is a saying in the army 'the more you sweat in peace, the less you bleed in war'. The same holds true for an epidemic. The more the organisational preparedness for an epidmeic, the less is the mortality and morbidity during an epidemic.

A contingency plan must be prepared fitting into the normal state administrative structure. Furthermore, in principle contingency planning for epidemic related emergencies should invariably be integrated into any existing natural disaster preparedness plan. This is not happening in the country/states so far.

The objectives of the contingency plan should be clearly defined - depending on the past record of the district. A "Nucleus of the District Epidemiological and Sanitation Centre" as envisaged under VII plan should be established. Priorities have to be chalked out depending on the types of epidemics occurring in the past and the surveillance reports.

Contingency plan

This operation consists of two parts, the first concerning logistics regarding the inventory of resources both existing and required, and the second being technical consisting of the preparation of investigation and control plans for the most probable epidemics in the region. It is dealt in unit 1-2. It involves preparing an inventory of and plan for mobilisation of existing and required resources in terms of:

i. Materials, equipments and drugs
ii. Finance
iii. Manpower - including technical and non-technical.

iv. Community resources.
v. Voluntary and non-governmental agencies.
vi. intersectoral and sectoral support and
vii. Transport

10.2.6 Unit Review Questions

1. What is surveillance and what is its relevance?
2. What are the common surveillance techniques?
3. What are sentinel centres and their significance?
4. Who are spotter and what is their role in forecasting an epidemic?

10.2.7 Test Items

Please select the most suitable or the correct answer from the following and tick against that:

1. Forecasting of epidemics does not depend upon

   (a) surveillance of communicable diseases
   (b) investigations of specific diseases
   (c) data from sentinal centres
   (d) morbidity data regarding non communicable diseases

2. Data regarding epidemics in the district is obtained from

   (a) district records only
   (b) PHC and CHC records
   (c) data from private practitioners
   (d) All of the above.

3. For forecasting of epidemics the data is not analysed against

   (a) prevalence of disease
   (b) age groups
   (c) regional variations
   (d) age specific mortality

4. The role of a DHO in an epidemic consists of

   (a) making only public health staff and community alert.
   (b) preparing the contingency plan only
   (c) arranging and organising resources
   (d) all of the above

5. During epidemics the DHO is expected to provide active support with respect to:

   (a) laboratory services in the hospital only
   (b) laboratory investigation at the PHC level
   (c) setting referral laboratory services in the district at appropriate level
   (d) none of the above.

10.2.8 Suggested Readings

1. P. Bres, Public Health Action in Emergencies caused by epidemics, WHO, Geneva, 1986.

2. Abram S. Benerzon, Control of communicable Diseases in Man, American Public Health Association, New York.

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4. P V Kondrashin and K M Rashid, Epidemiological considerations for Planning Malaria control in South East Asia Region, WHO, SE Asia Series No.17, New Delhi, 1987.

5. Development of Strategies and Approaches to Malaria Control in South East Asia Report of a Regional Technical Consultation, SEARO Technical Publication No.9 1987.

6. WHO, Epidemiology of Leprosy in Relation to Control Report of a Study Group. Technical Report Series No.716 Geneva, 1985.

7. WHO, Epidemiology of Work - related Dieseases and Accidents Technical Report Series No.777 Geneva, 1989.

Unit 10.3 Managment of Epidemics

10.3.1 Objectives

At the end of the unit the students are able to:

(i) to identify the steps involved in managing an epidemic
(ii) to formulate plan of action for the investigation of an epidemic
(iii) to institute the system of epidemic management in the district

10.3.2 Key terms & concepts

Case definition - suspect, probable and confirmed; formulating and testing hypothesis; surveys - medical centre and community

10.3.3 Introduction

You may now be in a position to forecast an epidemic from the data available with the MI system of the district. There may exist a surveillance system in the district health organisation. It must be throwing clues for 'suspected' cases which could be immediately notified. This alert is all the more necessary if there is a 'potential' epidemic. Despite the best of efforts, however, there are problems and the investigation of an epidemic is often undertaken after it has occurred.

To begin with we shall go through the epidemiological study of Non A - Non B viral Hepatitis in nurses hostel, Raipur, Madhya Pradesh.

The first case of jaundice in the nurses' hostel occurred on 3rd April, 1985 in Raipur, Madhya Pradesh. She had visited Kharagpur town of West Bengal during the last week of February 1985. This was followed by two cases on 17th May and 6 cases in June. The largest number of 24 cases occurred during July, followed by the decline to 5 cases in August. In all there were 38 cases in the hostel with the peak incidence during the week, 21-27 July, 1985. Major symptoms of the cases were jaundice (100%), dark urine (100%), fever (87%) nausea (84%) vomiting (77%) and anorexia (68.7%). There was no history of diarrhoeal disease prior to jaundice became mainfest.

Institutional records of viral hepatitis for the past three years were studied. In D.K.Hospital, Raipur, 90 cases were admitted during May-July, 1985. In contrast 20 and 39 cases respectively were admitted during the corresponding periods of 1983 and 1984.

The hostel be divided symetrically into right and left wing. The overall attack rate was 21.2%. The attack rate in left and right wings was 29.7% and 13.7% respectively. All the cases were in the age group 21-40 years. The two wings of the hostel have separate water supply lines. The septic tank situated in front of the left wing was overflowing, submerging the water-pipe line of the left wing. This contamination of drinking water was perhpas responsible for the significantly large number of cases in the left wing. The attack rate in the right wing was higher than expected. This could be due to the fact that the water supply to the kitchen and dining hall was

from left wing pipe line and the residents of the right wing had enposure there. In addition the boarders of right wing were visiting their left wing inmates.

Case-control study

30 cases of jaundice were matched with 30 resident nurses who did not suffer from jaundice. Information was gathered regarding their professional duties in the hospital during the preceeding 6 months. History of handling of blood, syringes, contacts with a jaundice case, drug addiction, food consumption, water drinking and visits outside the hostel was taken. There was no difference between the two groups in respect ofthese variables other than the contamination of water supply in the left wing.

Survey

Two slum areas located in the hostel compound were surveyed. In one area 14 cases of jaundice occured in a total population of 140 (attack rate 10%). The water supply to this area was from the left wing of the hostel. In another similar area with a different water source had 3 cases among 138 residents. The attack rate of 2.2% in this community was significantly lower than the former area. This finding futher confirmed the hypothesis that contaimination occured in the left wing water supply.

Laboratory Investigation

Several samples collected from 38 active and recently recovered cases of jandice were examined for the markers of viral hepatitis A and viral hepatitis B by ELISA. Only 2 were positive for HBs Ag and none for HAVIgm.thereby indicating that NANB hepatitis was the cause of illness.

The first case in April possibly got the infection from outside the hostel. This might have been responsible for the contamination of water supply, giving rise to 2 cases in May which in turn gave rise to second generation cases in June. The incidence during the last week of July seems to be the third generation of cases. It is observed that the number of cases increased in geometric progression for three transmission cycles, followed by sudden fall in the number of cases due to availability of fewer susceptibles.

With active surveillance and effective control measures, atleast the third chain of transmission could have been prevented. The water supply through the existing pipeline was totally stopped, till it was fully repaired.

Discussion Points

1. Prepare a rough spotl map imagining the architecture of the hostel and the location of slums
2. Study the epidemic curve, spot map and other tables worked out by you critically and try to answer the following:

(a) Date of epidemic onset
(b) Duration of the epidemic

(c) Number of cases
Hostlers
Others
Total

(d) Describe the epidemic curve

3. What was the mode of tranmission of infection?

(a) Vector borne
(b) Droplet infection
(c) Person to person spread
(d) Zoonate infection?

10.3.4 Managing Epidemics at District Level

A. Investigation to Define the Case

(i) Verifying the validity of the first information.

The initial information of an epidemic is of paramount importance. The epidemiological surveillance is thoroughly scrutinised. The passive reporting from the primary health centre and the district hospital may show an increasednumber of cases thereby suggesting an epidemic.

An increased number of deaths due to a particular disease may be shown in the office of the Registrar, Births and Deaths. The initial information may also be received by a press report or by an active community leader lodging a complaint. The first step to be followed after receiving the news of a suspected epidemic is to gather all the information possible from all the sources and crosscheck it. Even if there is a "rumour" of an epidemic this exercise should be undertaken. Visits to the area of the 'suspected' epidemic should also be made. All the information thus gathered should be tallied. If the information from different sources is not in agreement the district health officers take a sigh of relief and abort the alert. If on the other hand the information is in agreement immediate action is initiated for the investigation and management of the epidemic.

Fig Checking the *Validity of Information about an epidemic and immediate action to be taken*

Initial Sources of Information

1. Epidemiological Surveillance (early warning system)	2. Report from Medical Facility	3. Report from Other sources (Press, rumours, Community, etc.)

District Health Officer's Decision of Epidemic

Information in agreement	Information not in agreement
↓	↓
Rapid on the spot inquiries	Alert aborted
↓	
If confirmed	
↓	
Immediate Action	

The investigation of an epidemic occurs after it has occurred, even if in the initial phase, and therefore the action required is multi-directional. The extent of the epidemic in terms of its geographical distribution and the people affected on the one hand is to be investigated. On the other hand the the cause of the epidemic and measures to be taken to curb its spread is also looked into. In order to prepare ourselves for another such outbreak a detailed investigation to define the factors and conditions responsible for it is initiated.

(ii) Preliminary step to define a case

Case Definition

Generally in case of epidemic the criteria for defining a case pertaining to a disease are available. The district health officer must define the case of the disease he intends to investigate. The case definition generally includes:

(i) the name of the disease
(ii) the common and uncommon signs and symptoms of the mild, moderate and severe form of the disease.
(iii) the criteria for deciding a 'suspect', presumptive and 'confirmed case.
(iv) Confirmed laboratory tests if any.

If any disease has to be investigated one must make a provisional case definition which may be improved later on.

(a) Suspect Cases

The clinical signs and symptoms are compatible with the disease but no laboratory evidence of infection is present e.g. A patient with the clinical signs and symptoms of cholera and passing rice water stools is a 'suspect' of cholera.

(b) Presumptive Case

A case is labelled as presumptive when the clinical signs and symptoms are compatible with the disease and the laboratory evidence is suggestive of recent infection but does not prove it

conclusively e.g. If in a dark field microscopy the image of shooting stars in the sky are seen. It is a presumptive case of cholera.

(c) Confirmed Case

A case is confirmed only when the laboratory evidence conclusively confirms current infection e.g. A confirmed case of cholera is one in which the stool specimen on culture shows vibrio cholera. For confirming a case the help of advanced laboratories outside the districts may have to be sought. You have to manage all types of cases whether suspect or presumptive or confirmed.

(iii) Raising Initial Hypotheses

The formulation of an initial hypothesis is a must. It should regard the nature of the disease the origin of the outbreak and the mode of transmission. Initially information is incomplete and our diagnosis is based on that but on collection of more information it is likely to be modified, refined or totally changed based on the findings of the investigations. Still formulating hypotheses is essential as a guide to further investigations and confirming the case.

Check points

1. Why it essential to validate the information about an epidemic?
2. Distinguish between presumptive and confirmed case.

10.3.5 Organisation of field operation

The organisation of field operation shall depend on the accessibility to the epidemic focus and the availability of the staff. Field teams shall be organised and each team allotted a sector. The size of the sector shall depend on:

i) ease of access and of movement within the sector
ii) the transport facilities available
iii) the population density
iv) the time required to find and examine a patient
v) the time required to collect laboratory specimens
vi) the time required for completing emergency control measures
vii) communication facilities available.

Investigation of the epidemic in the field

1. Verification of the diagnosis

Laboratory investigations are a must to diagnose a 'confirmed case'. However, the epidemiological investigations should not be delayed till the final investigation reports are available. If the district lacks in adequate laboratory facilities, the DHO should send the specimens to other laboratories for diagnosis. Once the diagnosis has been confirmed for a sample of cases further confirmation of cases is not mandatory. Presumptive cases or even suspect cases need to be treated as cases. For instance if a few cases of cholera are confirmed by

culture then even for presumptive cases (shooting stars seen on dark field microscopy) or suspect cases (loose rice water stools) without further investigations for confirmation they should be treated as cases of cholera.

II. Case finding

This is the most crucial step in the investigation of the epidemic and should be given utmost importance:

A. Case description recording

A standard form for disease specific case investigation should be drafted before hand. This should contain the information in all details and the completeness as given in form 'A' for comparbility of the information collected. It is impssible to devise a common form that can be used for all epidemics. Thus, for a disease a specific case investigation form drafted for the study should be used by all the investigators.

It has been observed that due to the pressure of time required attention to patient records is not given as to identify them correctly. Often the serial numbers allotted to cases, forms and specimens and the labelling of specimens etc. is ignored or is incomplete. It should be emphasised on the workers that the above informations are very crucial and in no case should be ommitted as important data are too often rendered meaningless or misleading because of errors/incompleteness.

Model form for case description and recording (Form A)

Identifying information

Case number
Source of report (e.g. community, clinic, or hospital)
Person who prepared report (Name, title, address)
Place report prepared
Date report prepared

Personal (case) data

Name, age, sex
Name of head of household
Residence
Place where patient became ill, if different from residence
Immunization (Only if relevant to disease being investigated)

Clinical information

Check list of signs and symptoms (relevant to the disease, always including space for "Others")

Degree of severity (severe or mild)
Date of onset (and time of day, if relevant)

Date of end of illness, if now recovered
Date of death, if deceased

Laboratory examination

List of laboratory specimens, including for each
type of specimen(s) and serial number(s)
type of test
date collected
storage temperature
date shipped
route of shipment
laboratory
date results reported
results

Treatment

Antibiotics and other drugs used

Exposure history

Relevant dates (i.e. of time interval between maximum and minimum incubation periods)
Relevant activities (depending on disease)
Travel
Contacts with known cases
Source of food and water
Exposure of animals and animal products
Exposure to disease vectors or reservoirs, etc.
Laboratory examination of possible sources (details as for laboratory examination of case)

Surveys

1. Institution Based Surveys

An institution-based survey should not be restricted to hospital alone but should cover other health centres as well including dispensaries. The survey should use Form 'B'. It includes:

- a seasrch for suspected cases during the visit to the centre
- a retrospective survey
- the establishment of prospective surveillance

A retrospective surveys should be conducted using records of inpatients, outpatients and laboratory results going back over the previous three months or so. Special attention should be given to cases that might have been misdiagnosed such as those for which the records show:

- cause of death unknown
- patient removed from hospital

- symptomatic diagnosis: fever, influenza, vomiting, diarrhoea, jaundice, polio, conunctivitis, headache
- unconfirmed diagnosis 'malaria', 'dengue' 'typhoid' 'pneumonia', 'varicella'

Model of medical centre investigation form (Form B)

Investigator: Date of investigation _____
Medical Centre: Outpatient clinic _____
or inpatient ward _____

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1. Line Listing of Cases

Make sure that the addresses of contacts and the serial numbers of laboratory specimens have been recorded on Form A.

Sr. No.	From A No.	Name	Age	Sex	Address	Date of onset	Laboratory specimen(s) Nature	Container No.
1.								
2.								
3.								
4.								
etc.								

2. General Comments

Include relevant aspect of Form A

---

2. Community Survey

Just managing the notified or cases brought to knowledge will not result in effective management of the epidemic because it can penetrate to any level in the community. Therefore, community surveys are very crucial. Thus it is required that the DHO will form a team of investigators to conduct the survey in the sectors of community allotted to them. The aim is not to discover suspected cases only but also to investigate the "epidemiological factors" that may have contributed to the spread ofthe causative agent in the community. The following community characteristics of epidemiological significance should be investigated using form 'C'.

Model from for community investigation (Form C)

Investigator: Date of investigation
Place:

---

1. Community Profile

Type: Urban Rural Other (specify):

Geography:
Economy:
Social classes:
Endemic Diseases:
Epidemics (dates):
Immunizations (dates, groups):
Water sources:
Food:
Waste treatment:
Rodents:
Anthropods:
Rains (Seasonal):
Other (Flood, drought, immigration, overcrowding, etc.):

2. Census

Date and origin

Sex	< 1-4	5-9	10-19	20-39	40-59	60 or 60 +	Total
Male							
Female							
Total							

3. Listing of Cases

Make sure that the addresses of contacts and the serial numbers of laboratory specimens have been recorded on Form A.

Sr. No.	From A No.	Name	Age	Sex	Address	Date of onset	Laboratory specimen(s) Nature	Container No.
1.								
2.								
3.								
4.								
etc.								

2. General Comments

Include relevant aspect of Form A

The information is to be collected regarding the following:

- Geographical location
- Climatic conditions
- Economic resources
- Socio-economicstgatus
- Hygience standrds in house holds
- Medical surveillance and prophylaxis
- Portable water distribution and surveillance
- Sewerage System
- Food supplies
- Population movement
- Contants with animals (including insects)
- Recent disease outbreak and endemic diseases

3 Search for source of infection and contact tracing

The primary purpose of searching for the source of infection, either of an individual case or of the entire group of cases, is to eliminate, terminate, or isolate the sources so that similar circumstances do not occur again or are less likely to occur in the future.

For example, if the continued source of cholera epidemic has been an unhygienic pond then it should be filled (terminate the source). If the infection is from a well then the disinfection of the well should be done (elimination of the source). The case of cholera should be isolated and managed in an isolation ward. The methodology used shall vary according to the mode of transmission of the diseases being investigated. However, the steps to be taken and the order in which they are taken will remain the same:

- Identify the date or time of disease onset.
- ascertain the range of incubation periods for the disease in question

- look for a source of infection in the time interval between the maximum and minimum incubation periods.

IV.Collection and Transportation of Laboratory Specimens

As already discussed you must realise that success of epidemic management basically lies in the quality of Laboratory support. It is very critical in an epidemic investigation. The value of the results obtained will depend on:

- correct sampling of appropriate specimen
- correct storage, packaging and transportation of specimen
- appropriate formulation of requests for laboratory examinations
- the speed with which the laboratory responds to such requests.

Check Points

1. Why is case finding is a crucial step in investigation of the epidemic?
2. What is the role of community survey in epidemic investigation?

10.3.6 Analysis of data

The data are obtained both clinically and epidemiologically. That needs to be analysed as suggested below:

The data of onset of the disease when the patient is examined the frequency of signs and symptoms should be tabulated at serial intervals upto the period of convalescence. It is important and may be as long as three weeks. The frequency of signs and symptoms during the courseof the disease may be represented by curves. The signs and symptoms will point to one or a number of clinical syndromes. The commonly encountered syndromes are:

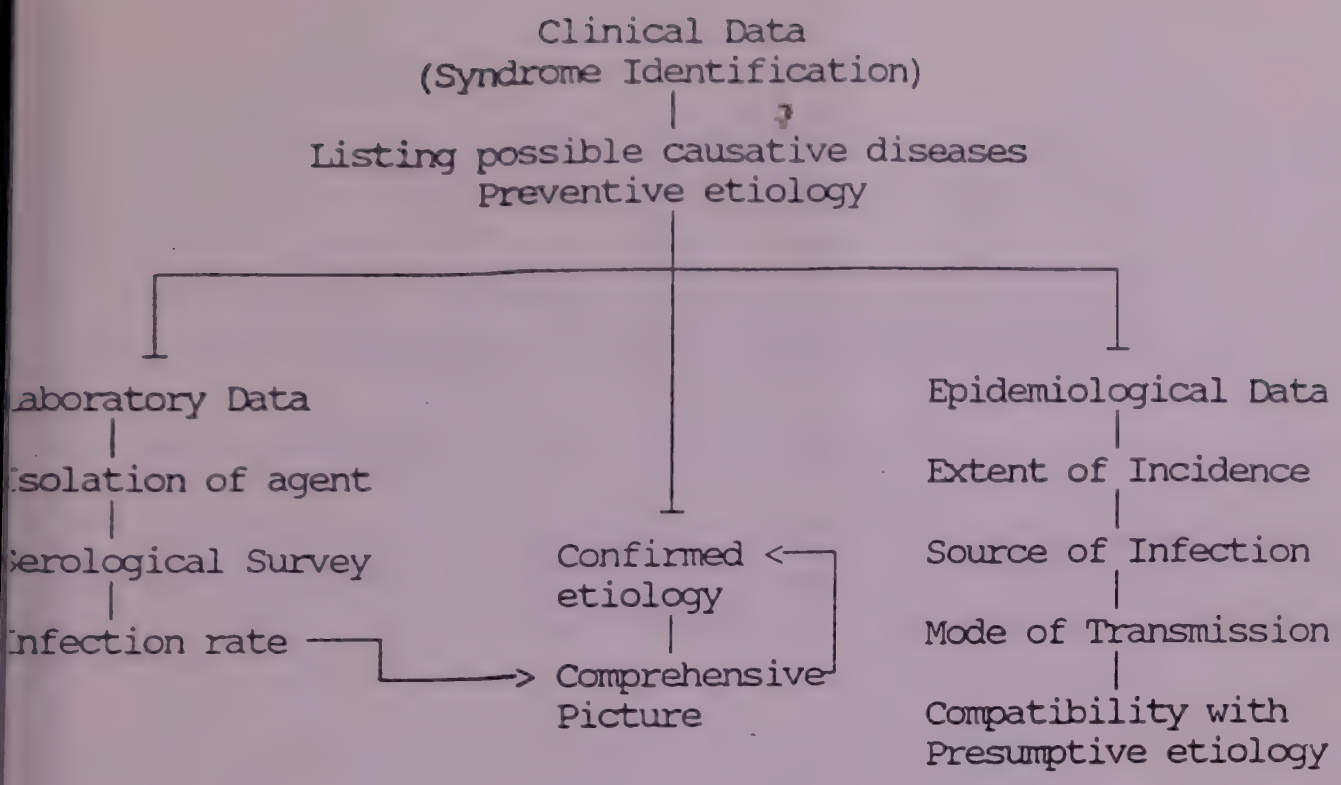
- febrile rash
- febrile respiratory tract disease
- febrile gastro interstinal disease
- febrile icterus
- afebrile disease
- haemorrhagic fever

The syndromes will give a clue to the list of possible diseases. The geographical considerations and the initial mode of occurrence shall define at least provisionally the diseases that can cause the epidemic.

B. Epidemiological Data

A good epidemiological description is urgently required for two reasons:

i) So that the size of the outbreak, the population groups most severely effected and the likelihood of continued spread can be determined; this is necessary for planning the provision of



Steps in the analysis of investigation data

(ii) So that a hypothesis can be formulated as to determine the causative agents, the mode of transmission, and the probable progress of the outbreak this is necessary to guide control efforts based on data analysis.

In the management of epidemics it is the incidence rates and case fatality rates which generally provide dependable information.

(a) Incidence Rates

The incidence rate is the number of new cases that occur in the community generally calculated per thousand of the population. These are one of the just to be calculated for different population sub-groups so as to identify those at greatest risk. They are calculated for the common personal characteristics like age, sex and occupation Investigation of a food borne outbrreak may require the division of those effected into a number of sub groups based on the composition of the meals consumed.

(b) Case fatality rate:

This is the proportion of the cases contacting the disease that die. The case fatality rate differs depending on the population sub-groups considered e.g. hospitalised cases, all event cases, all infected cases.

(c) Prreparation of spotl maps

They show the location where the cases occur. As they do not by the demoniator into consideration they do not show the incidence rates. They are to supplement and not replace the incidence rates.

(d) Distribution of cases in time

This can be best shown by a histogram. The distribution of cases by time may show possible relationship between incidence and factors such as age, sex, occupation, the effect of control measures on the outcome of case.

C. Formulating and testing hypothesis of causation

Contact tracing usually points to one of the following tranmission patterns:

i) tranmission from person to person, originating from a 'single index case' (which may not be recognised).
ii) transmission from a common source (point source) which may be due to infected arthopods, animals, food or the environment, with no further person to person tranmission.
iii) common-source tranmission followed by person to person tranmission e.g. water borne typhoid fever.

Ex cretion route	Infection route	
	Direct	Indirect
Respiratory speaking, sneezing, coughing	Face to face contact (less than 1 m.)	Aerosols toilet articles
Saliva	Mouth-to-mouth contact	Glass vessels tooth brushes, towels, forks and spoons
Faecal	Hands	Water, food, toilet articles
Urine	Hands	Aerosols, splashes during nursing
Eye secretions	Hands	Ophthalmic instruments, toilet articles
Cutaneous and mucous membrane, lesions, genital infections	Skin, abrasions, cuts, sexual intercourse	Toilet articles, bed linen, dressings

Routes of person-to person tranmission

One or several hypothesis of causation will be deducted from the critical analysis of the observed tranmission pattern and will have to be confirmed by statistical analysis.

10.3.7 Control of an Epidemic

The control of an epidemic, once it has broken out, requires a multipronged approach. The following three areas are to be given top priority:

i) Management of cases
ii) Determining the source of infection
iii) Interrupting the tranmission of infection

i) Management of cases

This is the first and the most important step in the control of an epidemic. Each and every patient should be provided with the best possible medical care. In an epidemic of a disease like gastroenteritis and cholera where there may be a sudden sharp rise of cases in a localised area it may require mobilisation of the staff. The sub-centre building, schools or community development blocks that have already been identified may have to be converted into make shift hospitals. The laboratory support, as described earlier, should be provided at the earliest to manage both the cases and the epidemic.

ii) Determining the source of infection

On the one hand patients are being treated on the other efforts should be channelised to find the source of infection. This is easier said than done. While tracing the epidemic backwards attempts have to be made to find how the case got infected and what was the mode of transmission.

iii) Interrupting the tranmission of infection

The epidemic shall end only when the tranmission of infection has been interrupted. While the investigations are going on to determine the source of infection interrupting the tranmission of infection should be aimed at. Protection of the persons at risk should be given top priority. The mode of tranmission may be.

(a) person to person tranmission, whether direct or indirect
(b) common source infection
(c) a combination of both
(d) Protective measures in outbreaks of diseases with person to person tranmission:

1. Patients

The best possible medical care should be given to the patients and if need be they should be isolated.

2. Disinfection:

Disinfection of excreta, urine, secretions, discharges, dressings and beddings depending upon the disease have to be religiously carried out.

3. Contacts:

A person, depending on the closeness of contact with the patient, is at risk of being infected. Two types of contact may be distinguished.

(a) Close contact: It is a person who has had occasional face to face contact, has given personal care without protection measures or has shared the same meal or room during the period of communcability or handled the patients' belongings.

(b) a "possible contact" is a person who does not satisfies the above criteria but may have been exposed to similar situations.

- in public transport
- in the next bed in a hospital ward
- in the same work place
- close contact with a patient probably outside the period of communicability though not certainly

All the contacts should be kept under close surveillance and immunised if the vaccine can be of help.

4. In community

a) 'Mass gatherings': One may contact in schools or mass prayer situations restrictions may be imposed including closure of schools or public places, but their effectiveness is limited.

b) Travel :

These may involve establishment of 'cordon saniture' i.e. sanitary area to isolate the epidemic focus. This is more justified when immunisation is possible so that unimmunised persons do not travel and carry the disease.

5) Mass immunisation

It is possible in a few diseases to give mass immunization but there is a delay till the total community is protected. So other methods may also have to be applied the following:

Indications are suggested for passive immunisation during emergencies:

Sr. No.	Disease	Type of immunization preparation	Indications for use of tests required
1.	Botutism	Trivalent bottlinal anti toxim (B&E) or the specific anti toxin required	Before administration check for sensitization to horse serum
2.	Diphtheria	Anti toxim	Before administration check for hypersensitive

Table Continued...

3.	Varicella	Human varicella zoster immune globubin	Give within 3-4 days of exposure. Limited supplied restricted to special medical indications
4.	Viral Hepatitis A	Human immune globutin with a specific title of at least 100 I.U.	Should be given to household contacts within 2 weeks of exposures, travellers at risk
5.	Viral Hepatitis B	Human hapatis B immune globutin	Household contacts

vi. Chemoprophylaxis

Chemoprophylaxis is useful at times for persons in contact with the source of infection or with an infected person. Some indications for chemoprophylaxis are being described in the following table:

Disease	Indications and drugs used
Cholera	Tetracycline or furazolidone for household contacts
Bacterial conjuctivitis	Erythromycin ophthalmic ointment
Diptheria	Erythromycin and first dose of vaccine
Menigococcal meningitis	For household or close community contacts sulphadiazine (only if the meningococal strain is shown to be non-resistant (0.5gm for children 1.0g for adults every 12 hrs. for 4 days) Rifampicin is contraindicated so as not to develop resistance to treatment to leprosy.

(viii) Evaluation and Report Writing:

Once an epidemic has been investigated and the control measures properly implemented, a report should be written in detail. The evaluation of the causes and its effects should be done. Needless to say the control measures have to be suggested and the proper monitoring plan should be prepared so that if does not occur in future.

(ix) Control of outbreaks caused by a common source of infection

1. Disease with environmental source of infection

Dis-infection of water – both domestic and community is required. For domestic disinfection, the easiest method is to bring it to a "rolling boil" for five minutes. All the other sources of water like wells, tanks and ponds should be disinfected. The recreational use of water should be

discouraged during epidemics. Liquid and solid wastes should be disposed off in sanitary manner. During epidemics the dead may be a source of infection and should be disposed off using proper precautions.

2. Vector borne diseases

Certain diseases like dengue fever, Japanese encephalitis are transmitted by mosquitoes. Special efforts should be taken to eliminate them.

Check Points

1. A social worker visits your office and tells you that five children had died due to gastroenteritis in the past two days in his village. What will you do?
2. Your monthly statistics shows a sharp rise in the cases of viral hepatitis in a school hostel. How will you proceed?
3. How will you investigate a suspected epidemic of cholera in a tehsil? How important is sanitation in spread of the disease? What measures will you take to improve it?
4. What measures do you take to protect a person who has come in contact with a confirmed case during an epidemic.
5. What is active and passive immunisation? How is chemoprophylax is helpful in controlling an epidemic?
6. What measures would you take to interrupt transmission of an epidemic?

10.3.8 Planning for epidemic situations in the district

To manage epidemics effeciently and effectively it is essential to plan for mobilising resources and streamlining the logistics and support system in addition to M.I.S. which is basic to forecasting and monitoring the control programme. It may involve preparation of a contingency plan which may include preparing an inventory of and plan for mobilization of resources during an epidemic if it occurs. The district health officer should not only be able to tap these resources but should be able to optimise mobilise and utilise them when he needs during the epidemic. The details of same are given below:

(a) Financial Resources

It is needless to say that money is required in the management of any emergency. All the possible sources from where the funds can be raised should be explored. The various heads under which funds are available in the district - both from the health budget and the district administration should be enumerated. The channels through which funds can be raised from the state headquarters and the national budget should be listed. The epidemic fund is available in the district in case of epidemics. The precise amount that is at available should be enquired into.

During an emergency the voluntary and philanthropic organisations are willing to lend a helping hand. All such organisations whether performing health or non-health services should be contacted and the details about the assistance they can provide during an epidemic should be

found out. The various social organisations like the lion's club and the Rotary club and the role they can perform should be investigated. The individuals who can donate money should also be listed. A list of socially active individuals who can raise money from the public should be made.

One important fact should always be kept in mind. Money is important but properly planned services can function very efficiently even with its relative lack. The money spent per person on health in our country is a small fraction of what is spend in the developed countries but still we are carrying out our services fairly well.

(b) Manpower

Training manpower the precise duties they are to perform is the most crucial step in the control of an epidemic. The most challenging job of the district health officer is collecting the various categories of personnel from all the possible sources, assigning them their duties and training them for the same.

(i) Specialists

All the specialists in the various specialities of medicine especially general medicine, chest diseases, paediatrics, gynaecology and obstetrics, community medicine, pathology and microbiology working for the government should be identified. A list of all the specialists in the above fields working for the voluntary and private sector should also be made. With all such specialists the roles they are to perform during an epidemic are discussed. Special emphasis should be laid on running a make shift hospital with the barest of facilities. The utilisation of the staff and volunteers should also be discussed.

(ii) Medical Officer

The medical officers in the district during the monthly meetings at the district headquarters should be oriented about the various tyupes of epidemics. They should be explained about the importance of training the persons regularly regarding the signs and symptoms and the management and reporting of the various types of epidemics.

The establishment of the peripheral health centres with outreach operations extending right up to the village level is another aspect which the medical officer should be aware of. This is very important for the management of an epidemic. The load at the hospitals is reduced and the functioning streamlined.

(iii) Para medical workers

The para medical workers - health workers - male and female and also the health assistants - male and female have an important role in the forecasting and the management of an epidemic. They should be aware of the various types of epidemics which occur in the area, and the seasons in which the different epidemics are more prone to occur.

The common signs and symptoms of all the common epidemic prone diseases should be taught to them. These teaching sessions should be repeatedly held in the monthly meetings at

the P.H.C. The precise role which a health workers is supposed to perform during the non-epidemic and the epidemic periods should be chalked out and explained to the workers.

(iv) Auxiliary health workers

The auxiliary health workers like the village health guides, anganwadi workers and the trained births attendants should be trained. They are supposed to be taught the important and common signs and symptoms of the epidemic prone diseases and report them to the health worker male or female of the area immediateley. They are also to be trained to as to how set up an emergency peripheral health centre or an emergency hospital. How to motivate the general public to avail of the facilities and co-operate with the health authorities in fighting an epidemic is another area which has to be emphasised. Being a local resident of the village he or she commands much respect and authority.

The health workers in the area are to train these auxiliary health workers regularly. Every link in the chain is important and the malfunctioning of any one link shall affect the operation adversely.

(v) Technicians

Laboratory support is of utmost importance in the management of an epidemic. The technicians should therefore be identified and trained regarding the investigations they are supposed to carry out for each type of epidemic.

(vi) Volunteers

The volunteers can extend invaluable help in the management of an epidemic. All the possible volunteers should be identified from the voluntary sectors, charitable organisations and socially active individuals. Their qualifications and experience should based on their role and should be recorded. Dividing them into groups they should be trained and their addresses noted down so that they can be contacted during an emergency.

(vii) District Live stock officer

The veterinary doctors and their expertise may be required especially if there is a zoonotic element in an epidemic. A liaision with them is thus very important.

(c) Media

Efficient communication and quick dissemination of information to the masses is essential and all the possible sources should be tapped. The services of the radio transmitters with the police should be used for efficient communication during the epidemic. Arrangements should be made with the local radio station, the total newspapers to deliver health messages which the people should religiously follow during an epidemic. The duties of the block extension educator should also be spelled out.

(d) Community Leaders

The community leaders having a say should be identified and motivated not only to educate the people but also to co-operate with the district health authorities.

(e) Medical Care & Field Teams

The teams would require different categories of manpower, drugs and equipment annd means of mobility to perform well.

(f) Equipments

An inventory of all the available equipments required for fighting an epidemic has to be prepared well in advance. The various heads under which it has to be prepared are discussed below.

(g) Medicines

A list of all the medicines required for the management of the common epidemics has to be prepared. The stock of these medicines available in the PHCs, tehsil and district hospital has to be maintained and regularly checked. The medicines which can be availed in an emergency from the voluntary agencies, charitable institutions and the pharmaceutical companies in the district to be explored. The same holds true for

- Syringes and needles
- Sterilizers and auto claves
- I/V fluids
- Vaccines and vaccine carriers

(h) Resources needed for Emergency Immunisation Compaign

- List of suppliers, sources of obtaining vaccines, stocks of vaccines to meet anticipated requirement
- syringes (disposable or reusable after sterilisation)
- sterilisation equipment
- Immunising teams, transport cold chains
- Voluntary auxiliary personnel
- Cooperation of mass media

(i) Resources needed for Medical Care during epidemic:

- Location of hospitals and other health centres, by category
- Catchment areas of hospitals
- Usual number of in and out patients
- Number of beds in infectious disease wards
- Types of isolation available for patients
- Possibilities for extension of isolation facilities
- Facilities for intensive care

- Number of ambulances
- Requirements for additional personnel
- Location of referral hospital
- Executive staff to contact in case of emergency
- Possible additional facilities available such as schools, hostels etc.

(j) Transport

Freely available transport is required for the free movement of doctors and the health personnel and the transportation of the patients to the referral centres. A list of all the ambulances available in the district; the jeeps etc. which can be availed to the district health administration are to be prepared.

- Transport e.g. four wheel and two wheel drive vehicles
- lorries
- accommodation, food

Communication

- telephone

Equipment for

- Clinical investigation
- Collection of laboratory specimen

(k) Peripheral health centres and make shift hospitals

The possible sites for establishing temporary peripheral health centres should be identified. The schools, community development blocks which can be converted into make shift hopsitals have to be identified.

(l) Laboratory Support

The laboratories and the tests they can carry out should be enumerated. The routine testing can be done in such laboratories. Laboratories carrying out specialised tests like dterminining Australia antigen for hepatitis B. etc. should be identified. These are generally available in the medical colleges in the district and the district hospitals. A proper referral system for carrying out such advanced tests should be developed even if the samples have to be sent outside the district to the state hospitals or other reference centres.

(m) Information Needed on Laboratory Support

- Network of regional and referral laboratory support
- range of infectious agents that can be diagnosed
- level of dangerous pathogens to be tested
- number of specimens that can be processed
- arrangement for transporting specimens from periphery
- executive staff to contact in case of emergency
- portable equipment for field investigation

Check point

1. Identify the resources which need to be mobilized by D.H.O. to manage epidemic.
2. What resources and support does he require for confirming diagnosis and providing treatment.

10.3.9 Unit Review Questions

1. Describe the steps involved in managing an epidemic.
2. How is investigation of an epidemic carried out in field?
3. What planning is required to manage the epidemic in a district.

10.3.10 Test Items

1. There is a rumour that an epidemic of viral hepatitis has broken out in a sub-centre. As a DHO you would:

   a. Ignore the report about rumour
   b. Inform the civil administration to counteract rumour
   c. Educate the people to ignore the rumours
   d. Cross check the information and investigate

2. In a case of suspected epidemic as a DHO you collect all the possible information and cross check it. You find the information is not in agreement. Your proposed immediate action could be to:

   a. about alert
   b. intensify the alert
   c. investigate further
   d. start taking immediate epidemic control action

3. The district health officer defines the case of the disease he intends to investigate. The case definition generally includes all of the following except

   a. the name of the disease
   b. the common and uncommon signs and symptoms of the disease
   c. the incidence and prevalence of the disease
   d. confirmed laboratory tests

4. In the management of epidemics the knowledge of all the following is important except

   a. Incidence rate
   b. Case fatality rate
   c. persons who never had the disease in the past
   d. distribution of the cases over time

5. In which of the following outbreaks vaccine has no role in its control:

   a. Measles

b. Meningococial Meningitis
c. Typhoid
d. Polio

6. All of the following are labelled as close contact except

a. Person who has had occasional face to fare contact
b. has given personal care without protection measures
c. handled the patients belongings
d. been in the next bed in a hospital

7. All of the following are possible contacts except

a. travelled in the same bus
b. working in the same work place
c. close contact with a patient outside the period of communicability
d. took the meal together.

10.3.11 Suggested Rreadings

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Appendix 1

Key to test items

To check your progress please consult the key after you have attempted the unit cost.

Unit 10.1

1 (C)	2 (D)	3 (B)	4 (C)
5 (C)	6 (A)	7 (D)	8 (C)
9 (A)	10 (B)		

Unit 10.3

1 (D)	2 (D)	3 (D)	4 (D)
5 (C)			

Unit 10.1

1 (D)	2 (C)	3 (b)	4 (C)
5 (A)	6 (D)	7 (C)	